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SECURITY INFORMATION

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May 5, 1952

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Washington, D. C.

Subject: RR-2 Units

Dear Sir:

This letter supplements and forms a part of our proposal, dated April 30, 1952, for the manufacture of RR-2 units.

Specification No. 50-A-1003-A is, so far as we know, the only official specification for these units. We, however, have been given a set of test specifications and procedures for the unit, dated October 11, 1950, which we have been informally advised are the specifications by which current production of these units is judged. Our proposal of April 30 was predicated upon the construction of units meeting the October 11, 1950, test specifications. We have, as explained in our letter of April 30, checked one of the units against this specification and found that it met the specifications with a few minor and relatively unimportant exceptions.

In order that the record may be clear on the matter, we are setting forth below a step-by-step comparison of the specifications and our understanding of what is desired where a conflict exists. It deals with the final test only and not with the subassembly test details outlined in the October 11, 1950, specifications, since subassembly specifications are usually treated as an internal matter and the final performance of the receiver is the governing factor in acceptance of the unit. The paragraph numbers below refer to the correspondingly numbered paragraphs in Specification No. 50-A-1003-A. Since the test specification and procedure dated October 11, 1950, bears no identifying number and is, consequently, difficult to identify in the following, in order to simplify the discussion, we have designated Specification No. 50-A-1003-A, dated June 1, 1950, as Specification No. 1, and the October 11, 1950 specification as Specification No. 2.

C-10. Dial calibration accuracy - The dial calibration accuracy is stated in a different manner in the two sets of specifications. Our tests on the sample receiver indicate that Specification No. 2 can be met, and we ask that this be the governing specification, with the test frequencies to be the same as those outlined in Specification No. 1.

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C-11. Resettability. The sample receiver met the requirements of Specification No. 2, and we ask that this specification govern.

C-13. Antenna input impedance - This was not covered in Specification No. 2, and no tests were made on the sample receiver to determine compliance. We assume that receivers constructed in accordance with the manufacturing drawings will meet the requirement of the specifications.

C-15. Beat frequency oscillator - Specification No. 1 gives a ±5-kc limit on the adjustability of frequency. Specification No. 2 gives a figure of ±3 kc. Specification No. 2 also states that the zero position of the knob shall agree with zero beat within the limits of visual observation. Our tests on the sample unit indicate that the frequency of the beat note varies widely with adjustment of the gain control, so we do not see how the specification, if strictly interpreted, can be met. We ask that the above statement regarding the dial setting be omitted from the specification.

F-1. Sensitivity - There is a considerable discrepancy between Specification No. 1 and Specification No. 2 in this regard. Specification No. 1 calls for a 1.5-microvolt sensitivity, while Specification No. 2 permits a figure of 5 microvolts. Our test on the sample receiver indicates that the sample met requirements of Specification No. 2 by a wide margin. Whether or not this margin is true of all present production receivers, we do not know. We ask that Specification No. 2 apply.

F-2. Selectivity - Specification No. 1 sets forth the requirement. Specification No. 2 does not cover the factor of selectivity. We made no test on the sample receiver to determine its compliance with the specification since to measure same would involve removal of the receiver from the case and attaching test leads at various parts. We felt that it was undesirable to do this since we did not want to take the chance of disturbing the receiver alignment or operation in any way. We assume that receivers built in accordance with the drawings do meet the requirement of the specification although it is normal to expect that there will be some asymmetry in the shape of the selectivity curve. Degree of asymmetry is very hard to pin down in a specification. We ask that if an I-F selectivity specification is desired, it be written after we obtain production experience with the units, and that the specification be no more severe than the test papers on units selected at random from previous production lots indicate to be feasible.

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F-3. Image rejection ratio - Specification No. 1 requires a figure of 40 db. Specification No. 2 relaxes this to 30 db. We ask that Specification No. 2 apply. We note that Specification No. 1 introduces the factor of "standard output of 10 milliwatts" as being applicable when image rejection ratio is determined. We do not understand why the image rejection ratio would not be the same if measured at any output level which did not get into the region of overloading or, at the other extreme, masking by receiver noise. Incidentally, we note that at a number of points in Specification No. 1 the expression "standard output of 10 milliwatts" appears. Also in Specification No. 1, in several places the output load is mentioned as being 4000 ohms. In Specification No. 2 wherever the factors of output load and output po wer level appear, the values given are 10,000 ohms and 2.5 milliwatts. The output transformer is specified as "plate to 4000 ohms." It would seem logical to specify either an output load impedance of 4000 ohms or, alternatively, the output load across which maximum power is developed from the receiver.

F-4. Frequency stability - Specification No. 1 sets forth the requirement; Specification No. 2 contains no reference to this factor. At the time of our letter of April 30, we had not had time to test the sample receiver. Since then we have checked the sample in the following manner: There is sufficient leakage from the heterodyne oscillator appearing at the antenna post of the receiver to be detected through the use of a sensitive external receiver. This frequency was beat against that of a standard frequency assembly constantly monitored against WWV. The frequency of the heterodyne oscillator was set at 3.6 mc. The specification calls for a maximum deviation of .003%, equivalent in this case to 108 cycles. Over the time specified, the frequency of the heterodyne oscillator in the unit under test drifted 650 cycles, which is considerably out of specification. Due to lack of time, it was possible to check the frequency stability at only one frequency; but if this performance is typical, then we must ask that the specification be changed to reflect performance typical of units from prior production. The line voltage to the power supply was varied ±10%, and a frequency shift of ±20 cycles was observed, so it might well be advisable to specify that the line voltage be held constant while the frequency stability run was being made.

F-5. High-frequency crystal oscillator - Specification No. 1 contains the only reference to this. We did not measure the admittance across the crystal terminals of the sample receiver since we were not clear as to the method to be used.

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F-5. (Continued)

We ask that, if this specification is retained, we be allowed the same tolerances as applied to previous production runs of this item.

F-6. Spurious response rejection ratio - This requirement is in Specification No. 1 and not in Specification No. 2. The test data submitted on April 30 on the sample unit show that, for all practical purposes, the unit we tested met this specification. It is noted that, here again, the phrase "10 milliwatts into 4000 ohms" appears as a test condition. If a different power level and impedance, such as mentioned in several places in Specification No. 2, are to be used in future production, we ask that it be so specified.

F-7. Cross signal distortion pro ducts - There is no mention of this in Specification No. 2. Our tests of the sample indicate that it did not meet the requirements of Specification No. 1. If it is to remain as a pertinent requirement, we ask that the limits be set to agree with what it has proved feasible to obtain from prior production units.

C-2. Temperature and humidity - Due to lack of time and because we did not want to risk the possibility of damaging the sample unit, we did not conduct temperature and humidity checks on it. If prior production units do not meet the stated temperature and humidity checks in Specification No. 1, we ask that the specification be modified to reflect performance equivalent to that obtained in prior production units.

We would like to discuss several subjects which appear in Specification No. 2, but not in No. 1. The paragraph numbers given below refer to the similarly numbered paragraphs in Specification No. 2.

4.2.3. Crystal H. F. O. operation - Since we did not have a crystal of known activity to use in checking the performance of the sample unit, we are not able to determine whether the out-of-specification performance on the third harmonic of the crystal is typical. Here again, we must ask that we be not asked to meet any specification which requires performance beyond that possible with a representative sample of units from prior production.

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4.2.6. Noise output - The sample checked did not meet this specification on part of the low-frequency band. We are inclined to think that this particular specification is somewhat meaningless, since the signal-to-noise ratio specified is really what determines the usability of the receiver.

If there are any questions raised by this letter which require clarification, please get in touch with either [redacted] Chief Production Engineer, 25X1
or [redacted] Engineering Vice President. 25X1

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President

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